



Aviation Safety Department
2701 Forum Drive, D10
Grand Prairie, Texas 75052

AIRCRAFT WRECKAGE EXAM NOTES
Era Helicopters, Eurocopter AS250B2, S/N 3158
Sheep Mountain, Alaska
15 April 2008, 0923 LDT

I. HISTORY OF FLIGHT (NTSB)

On April 15, 2008, about 0930 Alaska daylight time, a Eurocopter AS350B2 helicopter, N213EH, sustained substantial damage during an in-flight collision with terrain, about 34 miles east of Chickaloon, Alaska. The helicopter was being operated by ERA Helicopters LLC, Anchorage, Alaska, as a visual flight rules (VFR) passenger flight under Title 14, CFR Part 135, when the accident occurred. The commercial pilot and three passengers received fatal injuries, and one passenger received serious injuries. A mixture of visual and instrument meteorological conditions prevailed in the area of the accident. The helicopter departed Anchorage about 0805, and company flight following procedures were in effect.

During a telephone conversation with the National Transportation Safety Board (NTSB) investigator-in-charge (IIC) on April 17, a communications technician who got off the helicopter before the accident, said he was dropped off at a remote communications site about 0900, and that the helicopter went to another site with other technicians aboard. He said the helicopter was to return in about four hours. When it did not, he said he contacted his shop.

Following a series of events, a search for the helicopter was initiated. The helicopter's wreckage was located by searchers on steep, snow-covered terrain, about one mile from the second communication site.

II. ACCIDENT SITE



III. AIRCRAFT INFORMATION



The aircraft was a Eurocopter AS350B2, S/N 3158, manufactured in November 1998. Based on aircraft records, it was calculated that the aircraft had accumulated approximately 4994.7 hours at the time of the accident. The aircraft had been relatively inactive during the winter months. It underwent multiple maintenance and inspections, including a Phase 5 Inspection, Airworthiness Check, engine and tail rotor installation (see aircraft records for details), on January 7, 2008, at a TTSN of 4983.7, 11 flight hours prior to the accident. Hobbs meter indicated 2599.5.

IV. PILOT & PASSENGER INFORMATION

- Benoit Pin, 39- Pilot
- Michael D. Seward, 37- Passenger (Alaska Department of Administration Employee)
- Thomas E. Middleton, 46- Passenger (Alaska Department of Administration Employee)
- Joseph C. O'Donnell, 47- Passenger (Alaska Department of Administration Employee)
- Quinn Ellington, 14- Passenger (Stepson of Michael Seward)

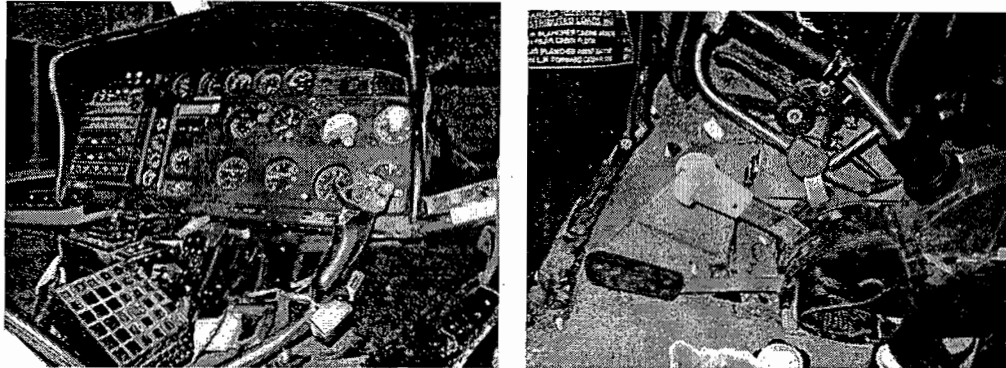
V. WRECKAGE EXAMINATION AFTER RECOVERY

A. Main Fuselage



- The main fuselage sustained damage consistent with a low forward speed, vertical impact on the lower right side of the fuselage.
- Crushing was observed on right lower fuselage.
- Aft right cabin door was crushed.

B. Cabin



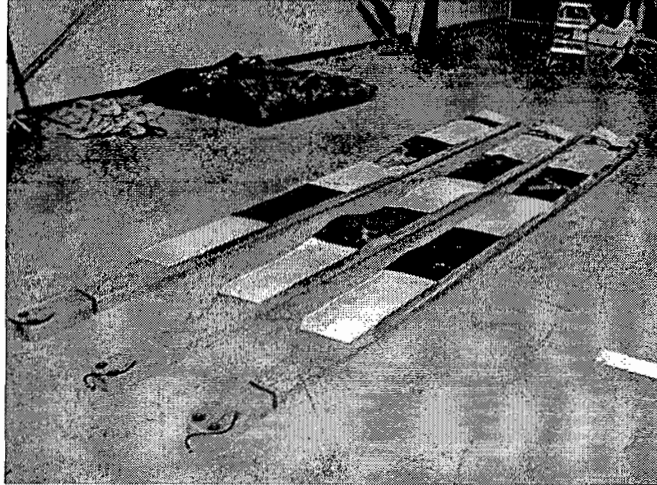
- The antitorque pedals were jammed in a left pedal forward position.
- The fuel cutoff lever was found in the cutoff position with safety wire broken.
- The rotor brake was in the stowed position.
- The Fuel Flow Control Lever (FFCL) was found jammed just slightly forward of the flight detent.
- FFCL and collective control continuity was confirmed to engine controls.
- Directional gyro indicated a 250-degree heading.
- All gauges were at zero, except Delta NG at -11 and Torque at 8.
- Transponder was set to 0700-ALT.
- FUEL PUMP, GENE, A/COL, PULSE LIGHT, AVIONICS MASTER, BELLY STROBE, DG, and FLOAT ARM pushbuttons on the center console were depressed.
- Cabin headliner was partially detached and hanging in the cabin area.
- Both front bucket seats had torn from cabin floor mounts.

C. Landing Gear

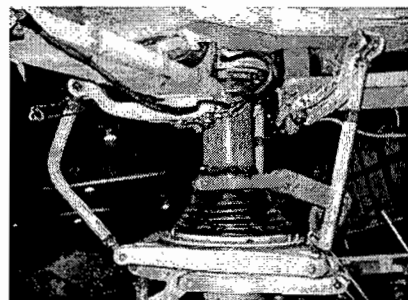
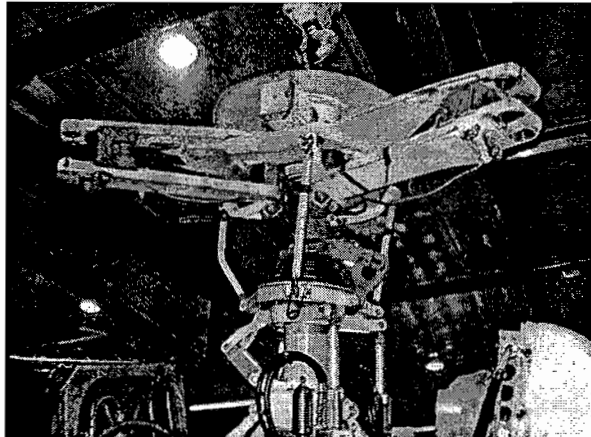


- Cross tubes were still attached at site.
- Aircraft skids were equipped with "bear paws."
- Right skid was broken from cross tubes with "bear paw" attached at recovery site.

D. Main Rotor System

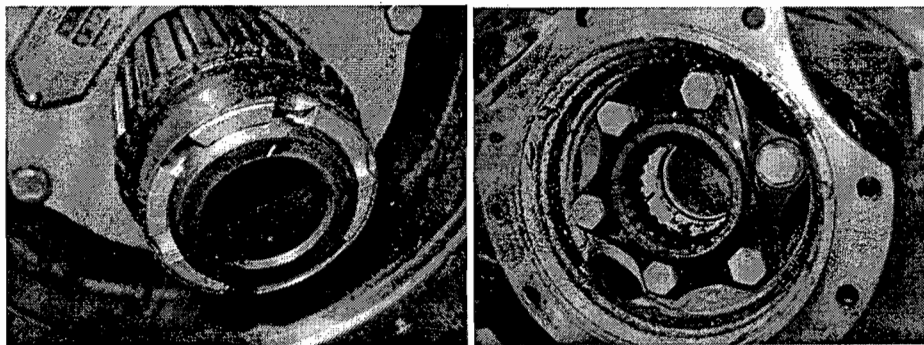
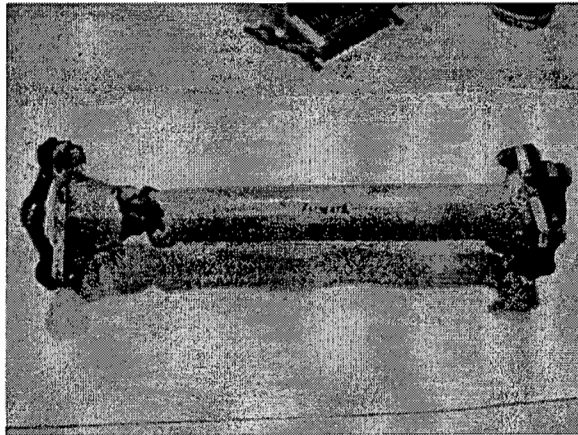


- Main rotor blades exhibited chord wise bending and trailing edge splitting.
- Evidence of impact with small trees and branches was observed on main rotor blade leading edges, particularly outboard half of red blade.
- Vertical puncturing of blade skin was observed on the outboard sections.
- Overall, blades exhibited signatures consistent with low rotor RPM at impact.



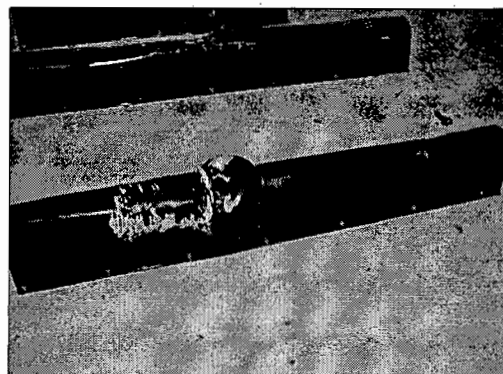
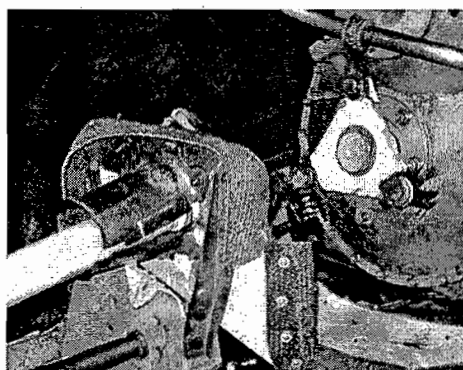
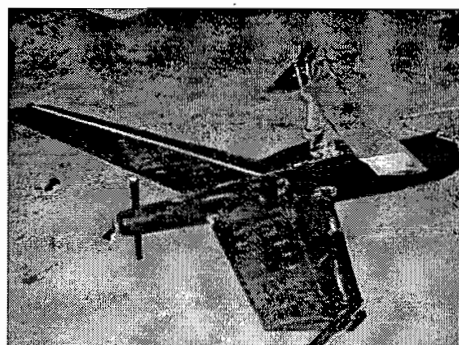
- The main rotor system could be rotated by hand in both directions with corresponding rotation of tail rotor output flange on aft end of engine.
- Both forward transmission support bars were broken and exhibited angular fracture surfaces.
- The yellow star arm fractured at an approximate 60-degree angle
- The blue star arm separated from its respective frequency adapter bushing.
- The red star arm remained intact

- All main rotor pitch links remained attached; the yellow pitch link exhibited a static bend (bowed outward).
- Control continuity was confirmed from the cyclic and collective controls to the left lateral servo.
- The fore/aft and right lateral servo input rods were broken at transmission deck and exhibited angular fracture surfaces.
- Control continuity was confirmed from the cyclic and collective controls to the break in the fore/aft control input rod.
- Another break in the right lateral control rod was observed at the mixing unit with angular fracture surfaces; control continuity from the cyclic and collective controls was confirmed to this point.
- Control tubes between mixing unit and transmission deck were warped due to impact.
- All control tube hardware was observed to be present and attached.



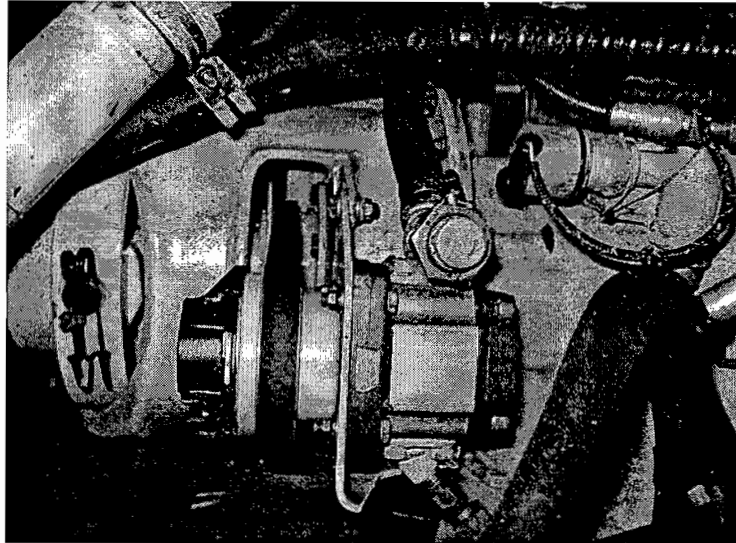
- The engine to main transmission drive shaft remained attached to the transmission input flange.
- The shaft was found twisted but not separated near the forward flange, reducing the length of the shaft, which had resulted in partial spline disengagement (backing-off)
- The engine output spline (left) and aft shaft spline input (right) exhibited rotational damage and polishing; metal debris was observed in the area.

E. Tailboom and Tail Rotor Drive System



- The tailboom was crushed downward near the fuselage attach area.
- The right horizontal stabilizer was crushed upward and aft.
- The tail rotor assembly separated from the tailboom just aft of the horizontal stabilizer.
- The forward tail rotor drive shaft flex coupling was found splayed and torsionally separated from the engine output flange.
- The short and long tail rotor drive shafts had decoupled at the spline connection.
- Corresponding rotational scoring from flailing was observed on the interior surface of the tail rotor drive shaft cowling.
- Tail rotor drive shaft and tail rotor pitch change rod were separated just aft of the horizontal stabilizer and exhibited angular fracture surfaces.
- Both paddles of the tail rotor assembly were cracked near the cuff and exhibited trailing edge splitting (low rpm signatures).
- Both tail rotor strike tabs were bent.
- Both boss weights had contacted the shaft with corresponding blue witness marks.
- The lower vertical fin was crushed slightly upward and left.
- The tail rotor gearbox rotated freely by hand.
- Movement of remaining section of tail rotor pitch change rod resulting in corresponding pitch change of paddles.

F. Hydraulic System

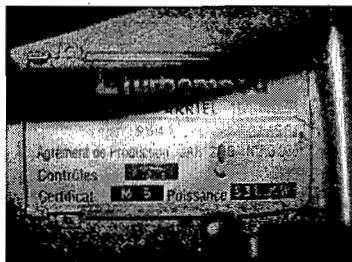


- All hydraulic system and servo hardware was observed to be present and connected.
- The hydraulic clogging indicator was not extended.
- The black hydraulic "poly-V" belt was found in place.
- The hydraulic pump was disassembled to check for spline coupling wear; spline coupling was properly lubricated and appeared normal.
- The HYD TEST pushbutton on the center console was not depressed.
- The hydraulic cutoff switch guard on the collective was broken/smashed, and the switch was in the down/hydraulics off position
- The HYD caution warning light bulb filaments appeared normal, not stretched.

G. Fuel System

- Aircraft was equipped with Purolator fuel filter STC; fuel filter was found clean.
- Fuel tank was compromised.
- Company estimated that the aircraft had around 110 gallons of fuel onboard at the time of the accident.

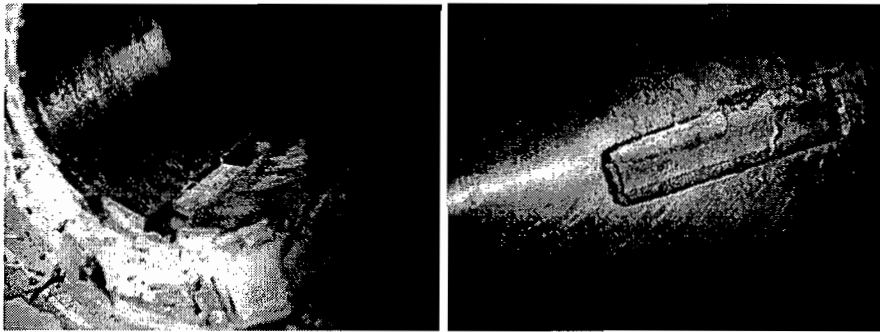
H. Powerplant



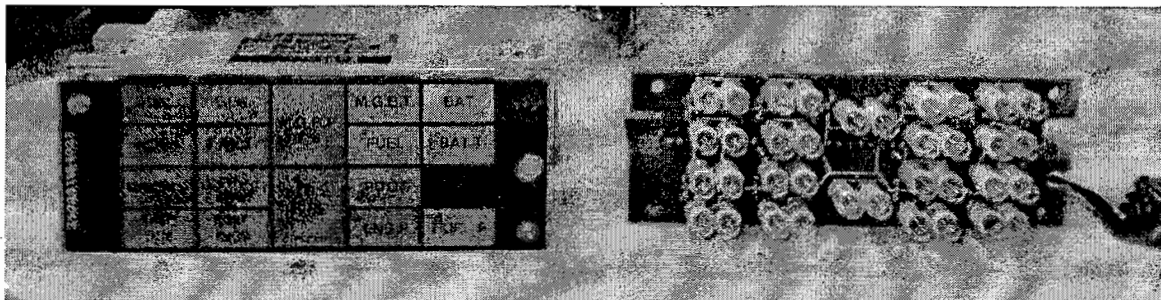
- The aircraft was powered by a Turbomeca Arriel 1D1 engine, S/N 9641.
- See Turbomeca accident report for more information.

I. Other

- Aircraft was equipped with snow/sand filter STC # SR00811SE
- Doors were designed to be opened via right pedestal switch when specified pressure differential was exceeded to ensure airflow; doors were found closed, switch was armed, but not activated.
- Aircraft was equipped with side baggage compartment "space pod" STC.
- 2 aircraft batteries were located in right baggage compartment.
- Tail rotor shaft key was examined following initial recovery examination and exhibited signatures consistent with an over torque event (see below)

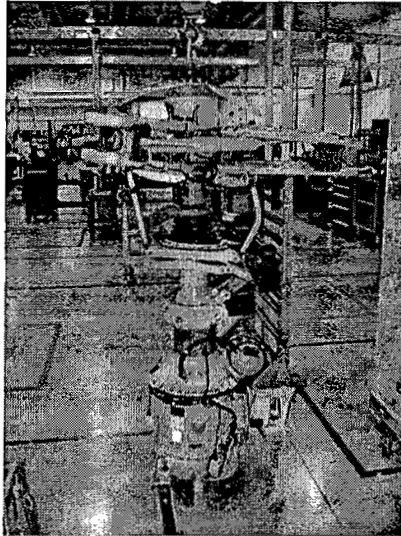


VI. CAUTION WARNING PANEL EXAM

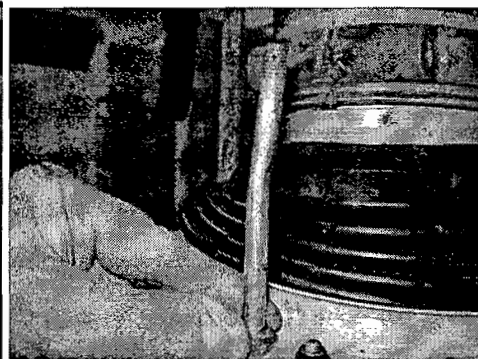
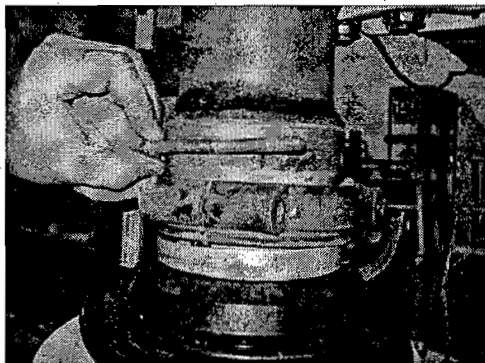


- A light bulb filament analysis of the light bulbs contained within the caution warning panel was conducted (stretch indicates illumination at impact).
- Each of the cautions (seen on panel above) is designed to be illuminated by two light bulbs behind it.
- No filament stretch was observed on any of the light bulbs.
- Several light bulb filaments were broken with no apparent stretch; these were:
 - Both GEN
 - Left GEN
 - Right ENG.P
 - Left FUEL.P

VII. MAIN TRANSMISSION EXAM



- The main transmission and rotor head assembly was examined on 21 May 2008 at American Eurocopter's Grand Prairie, Texas facility.
- The transmission was crated at Era, shipped, and secured until investigators arrived for examination.
- The main rotor head rotated freely with corresponding rotation of the transmission input flange.
- The magnetic chip detector was jammed, so the housing was removed; no metallic particles other than a very small piece were observed on the yellow magnetic surface.
- The rotor brake was disassembled and exhibited normal wear.
- The transmission was disassembled by module; no anomalies noted.
- A sufficient amount of oil was drained from the system.
- Epicyclic module magnetic plug was clean.
- The scissors drive bolt above the epicyclic was bent and exhibited contact damage with corresponding contact damage in its respective groove (see photos below).



- No anomalies were noted during the examination, which could have led to loss of rotation or sudden torque spike.

VIII. WEIGHT & BALANCE INFO

- Aircraft was estimated by the company to have had approximately 110 gallons of fuel and 291 pounds of cargo onboard at the time of the accident.
- Aircraft weight and balance calculations pending verification of pilot & passenger locations and weights.
- A gross weight of 4961 pounds was reported; this weight was not verified.

Lindsay B. Cunningham
Accident Investigator